

<p align="center">LLNL Environmental Restoration Division Standard Operating Procedure</p>	<p align="center">TITLE: Livermore Site Treatment and Disposal of Well Development and Well Purge Fluids</p>
<p>APPROVAL _____ Date _____</p> <p>Environmental Chemistry and Biology Group Leader</p>	<p align="center">PREPARERS: V. Dibley and G. Howard REVIEWERS: R. Bainer, R. Brown*, T. Carlsen E. Christofferson*, J. Duarte, B. Failor*, C. Garcia*, G. Howard, S. Mathews*, D. Ramsey*, and B. Ward*</p>
<p>APPROVAL _____ Date _____</p> <p>Division Leader</p> <p>CONCURRENCE _____ Date _____</p> <p>QA Implementation Coordinator</p>	<p align="center">PROCEDURE NUMBER: ERD SOP-4.7A</p> <p align="center">REVISION: 2</p> <p align="center">EFFECTIVE DATE: December 1, 1995</p> <p align="center">Page 1 of 8</p>

*Operations and Regulatory Affairs Division

1.0 PURPOSE

To ensure that investigation-derived ground water which is purged from monitor wells is properly treated and disposed of in a manner consistent with the protection of human health and the environment.

2.0 APPLICABILITY

This SOP was developed using the guidance provided by the U.S. Environmental Protection Agency (EPA) in *Guide to Management of Investigation-Derived Wastes* (EPA, 1991). This guidance states that “the management of investigation-derived wastes (IDW) must ensure protection of human health and the environment and comply with certain regulatory requirements that are applicable or relevant and appropriate (ARAR).” The guidance further states that “as a general rule, it will be necessary to use best professional judgment, in light of the site-specific conditions, to determine whether an option is protective of human health and the environment.” The following SOP reflects LLNL Livermore Site’s evaluation of applicable standards and its best professional judgment concerning the management of investigation-derived ground water. This procedure is applicable to the treatment and disposal of purged ground water produced by well development, aquifer testing, or ground water sampling activities. SOP 4.7B describes similar requirements for the LLNL Site 300.

Procedure No. ERD SOP-4.7A	Revision Number 2	Effective Date December 1, 1995	Page 2 of 8
-------------------------------	----------------------	------------------------------------	-------------

3.0 REFERENCES

- 3.1 Site Safety Plan for Lawrence Livermore National Laboratory CERCLA Investigations.
- 3.2 Applicable Operational Safety Procedures (OSPs), if required.
- 3.3 LLNL Health & Safety Manual.
- 3.4 U.S. Environmental Protection Agency (1987), *A Compendium of Superfund Field Operations Methods*, EPA/540/P-87/001.
- 3.5 U.S. Environmental Protection Agency (1991), *Guide to Management of Investigation-Derived Wastes*, U.S. EPA, Office of Solid Waste and Emergency Response, Publication 9345.3-03FS, October 1991.
- 3.6 Title 26, California Code of Regulations, Section 22-66699.

4.0 DEFINITIONS

4.1 Applicable or Relevant and Appropriate Requirements (ARARs)

ARARs are legally applicable or relevant and appropriate requirements, as used in the Comprehensive Environmental Response, Compensation and Liability Act of 1980.

4.2 Investigation-Derived Wastes (IDW)

For the purpose of this procedure, IDW is purged ground water produced by well development, aquifer testing, or ground water sampling activities. They may also be drill cuttings, core samples, and/or drilling mud which are typically produced during borehole drilling and monitor well installation during subsurface investigations.

4.3 RCRA Characteristic Waste

A waste which exhibits ignitability, corrosivity, reactivity, or toxicity.

5.0 RESPONSIBILITIES

Note: Responsibility Sections 5.1 and 5.2 are listed according to their level of authority to ensure that proper representation for all procedures and regulations related to this SOP are met.

5.1 Division Leader

The Division Leader's responsibility is to ensure that all activities performed by ERD at the Livermore Site are performed safely and comply with all pertinent regulations and procedures, and provide the necessary equipment and resources to accomplish the tasks described in this procedure.

Procedure No. ERD SOP-4.7A	Revision Number 2	Effective Date December 1, 1995	Page 3 of 8
-------------------------------	----------------------	------------------------------------	-------------

5.2 Hydrogeologic Group Leader (HGL)

The HGL's responsibility is to ensure that proper procedures are followed for activities (i.e., drilling, borehole logging and sampling, monitor well installations and development) and to oversee the disposal of all investigation derived wastes.

5.3 Environmental Chemistry and Biology Group Leader (ECBGL)

The ECBGL's responsibility is to ensure that the appropriate procedures are followed and that collection and treatment criteria are met.

5.4 Field Coordinator (FC)

The FC's responsibility is to ensure that there are adequate receptacles for the collection of purge water generated during the well development or aquifer testing.

5.5 Field Personnel

The field personnel are responsible for properly and safely following all applicable procedures. The field personnel are also responsible for notifying the Sampling Coordinator (SC) if purge water collection vessels need to be transported to and from the sampling location.

5.6 Field Support Technician (FST)

The FST's responsibility is to deliver and retrieve the appropriate collection containers to and from the sampling locations as designated by the SC. The FST will keep the SC informed of the status of all collection vessels.

5.7 Quality Control (QC) Chemist

The QC chemist is responsible for maintaining the most current Federal and State Maximum Contaminant Levels (MCLs) and Drinking Water Action Levels (DWALs), and Livermore Site discharge limits.

5.8 Sampling Coordinator (SC)

The Livermore Ground Water Monitoring SC's responsibilities are to ensure that purge water from wells containing contaminant levels exceeding discharge limits is collected and disposed of properly, direct the FST regarding the order of collector placement and retrieval at the sampling site, note the collection requirements necessary for each monitor well on the Sampling Plan or the Daily Operations Guide.

5.9 Study Area Leader (SAL)/Facility Task Leader (FTL)

The SAL/FTL are responsible for overall planning and estimating the contaminants likely to be present.

Procedure No. ERD SOP-4.7A	Revision Number 2	Effective Date December 1, 1995	Page 4 of 8
-------------------------------	----------------------	------------------------------------	-------------

5.10 Site Safety Officer (SSO)

The SSO's responsibility is to ensure the safety of ERD's ongoing operations and facilities and work performed. The SSO's responsibility is to receive the details of potential hazards and procedures for all field activities. The SSO directs this information to the LLNL Hazards Control Department to determine if a new Operational Safety Procedure (OSP) is required, thus assuring that an existing OSP addresses all ES&H issues for each operation.

6.0 PROCEDURE

6.1 Discussion

6.1.1 According to the Environmental Protection Agency (EPA, 1991) the "EPA has not established a presumption for the management of aqueous liquid IDW (e.g., ground water). It is left to site managers to determine the most appropriate disposal options on a site specific basis. Managers should consider volume of IDW, contaminants present in the ground water and in the soil, and whether the water is a drinking water supply. In addition, wastes should be managed consistent with the final site remedy."

6.1.2 Well Development Water

The treatment and discharge methods for well development water will be based on information available at the time of development. This information will generally include saturated sediment chemistry from the screened interval and/or nearby boreholes, ground water chemistry from near by wells screened at similar depths, and field screening using an organic vapor analyzer (OVA). If any VOCs are indicated, or if metals or tritium are expected in excess of the Livermore Site discharge limits, the water will be collected and either treated prior to discharge or delivered to LLNL's Hazardous Waste Management (HWM) for proper disposal. The QC Chemist will maintain a copy of the most recent Livermore Site discharge limits for VOCs, tritium, and metals. This list should be reviewed prior to discharging. If no data are available, the water shall be assumed to contain hazardous materials above the concentrations listed in Attachment A and shall be contained, sampled, and treated, if necessary in accordance with guidance from HWM.

6.1.3 Initial Monitor Well Sampling

The treatment and discharge methods for purge water from initial monitor well sampling will be determined from information available at the time of initial ground water sampling. This information will generally include saturated soil chemistry from screened interval and adjacent boreholes, ground water chemistry from near by wells screened at similar depths, a water sample collected during development, and field screening using an organic vapor analyzer (OVA). If any VOCs are indicated, or if metals or tritium are expected in excess of the Livermore Site discharge limits, the water will be either collected and treated prior to discharge, or delivered to HWM for proper disposal. If no data are available, the water shall be assumed to contain hazardous materials above the Livermore Site discharge limits and shall be contained, sampled, and treated if necessary, in accordance with guidance from HWM.

Procedure No. ERD SOP-4.7A	Revision Number 2	Effective Date December 1, 1995	Page 5 of 8
-------------------------------	----------------------	------------------------------------	-------------

6.1.4 Routine Ground Water Sampling and Hydraulic Pump Testing

Routine water sampling is usually performed quarterly, semi-annually, or annually. Disposal of the purge water shall be based upon the most recent analytical results that are not determined to be outliers. Treatment will be performed on purge water containing concentrations expected to exceed the Livermore Site discharge limits .

6.1.5. Procedure Exceptions

In developing this SOP, every effort was made to ensure compliance with all ARARs, as required in EPA, 1991. But as recognized in EPA, 1991, it is often necessary to use best professional judgment in light of site-specific conditions. Thus, the ECBGL has the option to grant exceptions to the above purge-water handling protocol. All exceptions will be granted only after consultation with project geologists, appropriate regulatory agencies, and other appropriate professionals. Exceptions shall be granted only after the ECBGL has determined that such actions are still protective of human health and the environment.

6.2 Office Preparation

- 6.2.1 Prior to the start of any well development, initial ground water sampling or aquifer testing, the FC, HGL, ECBGL, FTL, SC, and SSO shall exchange information such as the type and concentration of contaminants that may be encountered, quantity of purge water generated, as well as the level of personal protective equipment necessary for field personnel to safely conduct activities.
- 6.2.2 During the development of sampling plans and prior to the start of any routine ground water sampling activities, the SC shall review past analytical results, with an emphasis on the most recent, to determine what wells will require purge water to be collected, the amount of purge water which will be generated, and the types and concentrations of contaminants.
- 6.2.3 When necessary, the SC shall arrange with the FST to have an appropriate number of collection containers delivered to the sampling locations. New wells will automatically have collection containers supplied depending on the quantity and clarity of water.
- 6.2.4 The SC will provide the field personnel and the FST with a list of wells to be sampled daily. This is called the Daily Operations Guide or DOG. This list includes the amount of water to be collected at each location and any additional instructions dealing with the eventual disposition of all water collected.
- 6.2.5 Prior to the start of any well development or aquifer testing activities, the FC/FTL shall review the most recent analytical results, saturated sediment chemistry from the screened interval and/or nearby boreholes, ground water chemistry from near by wells screened at similar depths, and/or field screening data to estimate the contaminants likely to be present, to determine if the water needs to be contained and treated. If the water requires collection, the FC/FTL shall ensure that there is adequate receptacles for the collection of purge water generated.

Procedure No. ERD SOP-4.7A	Revision Number 2	Effective Date December 1, 1995	Page 6 of 8
-------------------------------	----------------------	------------------------------------	-------------

6.3 Field Preparation

- 6.3.1 The FST shall place the appropriate container for the collection of purge water immediately adjacent to and downwind of all monitor wells.
- 6.3.2 All ground water collection containers will be labeled "NON-POTABLE WATER."
- 6.3.3. Ensure that all containers have maximum fill lines clearly labeled. In the case of 55-gal drums, the maximum fill line shall be one-half full to facilitate handling.
- 6.3.4. Ensure that no sediment is present in the portable tanks.
- 6.3.5. Ensure that drums are in good condition (i.e., no leaks, etc.), and have water-tight lids and that portable tanks are in good working order.

6.4 Operation

- 6.4.1 Treatment and Disposal of the Purged Water
 - A. Drums containing collected water may not be left next to sampling locations after close of business.
 - B. All water collected in drums will be pumped into a tanker. Several wells may be composited in each tanker.
 - C. The FST will transport collected ground water suspected to contain VOCs above any applicable Federal or State MCLs or DWALs, or concentrations of VOCs that do not have MCLs or DWALs above detection limits, to the Livermore Site's disposal station, located at the Solar Detox staging area. The water in the tankers will be emptied at the earliest possible convenience by the FST to ensure collection space is possible for the next sampling event. Another option is to transport water to B-597 Corporation Yard and sparged prior discharge to ground.
 - D. If the Solar Detox area is used, the tankers are then emptied into two 5,000-gal poly tanks. The FST will log the gallons of water collected, the date, and the sources (well name) into the Collection Water Logbook at the Solar Detox trailer.
 - E. When the 5,000-gal tanks are nearing capacity, the FC is notified and the tanks are discharged into the influent stream of TFB. The water is treated, monitored, and discharged in accordance with TFB's NPDES permit. The Livermore Site QC Chemist will have the most recent copy of the permit discharge limits. Disposal methods for ground water containing tritium and metals are described below.
 - F. In the event of a change in this procedure, the SC will consult with the FTLs to determine the proper means of disposal.

Procedure No. ERD SOP-4.7A	Revision Number 2	Effective Date December 1, 1995	Page 7 of 8
-------------------------------	----------------------	------------------------------------	-------------

6.4.2 Disposal Criteria and Procedures for Ground Water Containing No Detectable Contaminant Concentrations.

If purged ground water contains no detectable contaminant concentrations, then discharge shall be made to an unpaved flat ground surface located at least 50 feet from arroyos, surface water drainage channels and storm drains. If necessary, use a hose to achieve adequate clearance from these drainage features. If the well is located off site, the water will be contained and discharged on LLNL property.

6.4.3 Disposal Criteria and Procedures for Ground Water Containing Tritium and/or Metals

If purged ground water contains tritium above 3,000 pCi/L and/or metals above the Livermore Site discharge limits, it must be collected and stored in a Waste Accumulation Area (WAA). The SC will consult with the FTLs, ECBGL, and/or HWM, and Operations and Regulatory Affairs Division representatives to determine the proper means of disposal or storage for eventual disposal.

6.4.4 Disposal Criteria and Procedures for Ground Water Containing VOCs, but Not Tritium, Metals, or Free Product

If purged ground water contains VOC concentrations above Livermore Site discharge limits, then pump purged ground water into containers and dispose of as described Section 6.4.1 of this SOP.

6.4.4 Disposal Criteria and Disposal Procedures for Monitor Wells that Yield Free Product

Free product and emulsions of free product with ground water should be handled as hazardous waste and disposed of by HWM.

6.4.5 Disposal Criteria and Disposal Procedures for Monitor Wells that Yield Compounds Not Discussed in Sections 6.4.1 through 6.4.4

Ground water that contains contaminants that have not been discussed earlier should be discharged into drums or tankers and stored appropriately in a WAA. Any additional disposal procedure for this water will be decided by the HGL or ECBGL.

6.5 Field Post Operation

6.5.1 Clean out any sediment in stripping tank, portable tanks, or containers. Sample and dispose of properly, in accordance with guidance from HWM. Inspect all drums for leaks.

6.5.2 Inventory equipment and supplies. Replace or repair all broken or damaged equipment.

6.6 Office Post Operation

6.6.1 Review field logbook and forms for completeness

6.6.2 Deliver original forms and logbook to the Document Control Officer

Procedure No. ERD SOP-4.7A	Revision Number 2	Effective Date December 1, 1995	Page 8 of 8
-------------------------------	----------------------	------------------------------------	-------------

7.0 QA RECORDS

7.1 Collection Water Logbook

8.0 ATTACHMENTS

Not applicable.